



# FLIGHT

The  
AIRCRAFT  
ENGINEER  
&  
AIRSHIPS



First Aero Weekly in the World.

Founder and Editor : STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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## Flight

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### CONTENTS

#### Editorial Comment

Aviation in House of Lords .. .. .	167
Britain at I.L.U.G. .. .. .	168
The Light 'Plane .. .. .	168
That Airworthiness Certificate .. .. .	168
A.N.E.C. Light Aeroplane .. .. .	169
Royal Aero Club Official Notices .. .. .	173
Royal Air Force Reserve .. .. .	173
Wing Radiators .. .. .	174
Aviation in the House of Lords .. .. .	175
Prize Designs for Air Mail Stamps .. .. .	176
London Terminal Aerodrome .. .. .	177
In Parliament .. .. .	178
Royal Air Force .. .. .	179
R.A.F. Intelligence .. .. .	179
Models .. .. .	180
Side-Winds .. .. .	180

#### INDEX FOR VOL. XIV.

The Index for Vol. XIV of FLIGHT (January to December, 1922) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy (1s. 1d. post free).



#### Aviation in House of Lords

THE general feeling among members of the House of Lords on the Air question, as voiced during the debate on defence on March 21, was one of uneasiness at what is now beginning to be universally admitted to be our state of unpreparedness in the air. For many months—even years—past we have been calling attention to some of the shortcomings of our defence scheme, notably in the matter of up-to-date aircraft. During the last twelve months the Royal Air Force has in the main been mounted on obsolete machines, “re-conditioned” so as to serve until the country should be in a position to afford new equipment. The time has now come—in fact has long passed—when the R.A.F. must be provided with new machines, whether the country thinks it can afford the expense or not, and Vote 3 of the Air Estimates provides for a fair amount of capital to be spent on the purchase of new aircraft.

Intimately connected with this urgent need for new equipment is the contemplated formation of new squadrons for home defence, but the general feeling is that, even including these, the forces available at home for defence purposes are on a scale very far from being adequate. The truth of this contention is not seriously challenged by anybody, and there is, in fact, a growing feeling in both Houses and among the public generally that it is possible to carry economy too far. As the Earl of Birkenhead said, this country can no more be content, during the next three, four, or five years, with a position of inferiority in the air than it would have been content with naval inferiority previous to 1914.

The general realisation of this fact lends even greater significance to the statement by the Duke of Sutherland, Under-Secretary of State for Air, that if the Cabinet came to the conclusion that the axiom laid down by the Coalition Government (that there would

#### DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :

- Apl. 12 .... Lecture, “Some Controversial Points in Aircraft Design,” by F. T. Hill, before I.Ae.E.
- May 11 .... Lecture, “Experimental Flying,” by Maj. M. E. A. Wright, before I.Ae.E.
- June 23 .... Grosvenor Challenge Cup, Lympne
- June 25-30 .... International Air Congress, London
- June 30 .... R.A.F. Aerial Pageant
- July .... Air Race for King's Cup
- July 20 .... Gothenburg Exhibition
- Aug. 1 .... Entries close from British Competitors for Schneider Cup
- Aug. 3-14 .... Rhön Gliding Competition
- Aug. 6 .... Aerial Derby
- Aug. 6-27 .... French Gliding Competition, near Cherbourg
- Aug. 8-12 .... F.I.A. Conference, Gothenburg.
- Sept. 23 .... Gordon Bennett Balloon Race, Belgium
- Sept. 28 .... Schneider Cup Seaplane Race at Cowes
- Dec. 1 .... Entries close for French Aero Engine Competition

1924

- Mar. 1 .... French Aero Engine Competition.

be no great war for the next ten years from 1919) no longer holds good, and if the Committee of Imperial Defence came to the same conclusion, and thought that a larger Air Force should be raised, then quite possibly a larger Air Force would be raised. Thus, so far from any great reduction being made in the Air Estimates, it is within the bounds of possibility that supplementary sums may be allocated later, in order that our present unsatisfactory position in the air may be at least partly remedied without delay. After four and a half years of comparative inactivity we appear at last to be awakening, as a nation, to the vital importance of aviation, a fact which FLIGHT naturally accepts with the greatest satisfaction, having for years—ten or more—preached the gospel that the future of the British Empire lies in the air. There is still ample room for controversy in the matter of ways and means, but once the necessity for strong action has been generally appreciated, the rest is a matter of detail and should be comparatively easy.

• • •

**Britain at I.L.U.G.** The announcement made by Sir Samuel Hoare in the House of Commons recently, in reply to a question by Admiral Sueter, that an official committee has been formed for the purpose of co-ordinating British effort in showing exhibits at the forthcoming exhibition at Gothenburg, is gratifying. The committee is under the chairmanship of Sir Sefton Brancker, and includes representatives of the Air Ministry, the S.B.A.C., and the Department of Overseas Trade, and it is to be hoped that arrangements will be made to send a really representative selection of machines to Sweden for the exhibition. In this connection the seaplane should not be overlooked, as being a type particularly suited to Scandinavian conditions.

So far nothing has been said about sending a squadron of the R.A.F. As we have stated repeatedly in these columns, we consider a great deal of good might be done by sending such a squadron. It is understood that France is sending a squadron, which will take part in the competitions, give demonstration flights, etc., and a similar squadron from this country would help greatly by "showing the flag." There is little doubt that the Admiralty will send more than one man-of-war to the marine exhibition which precedes the aircraft show, so why not an R.A.F. squadron?

• • •

**The Light Plane** Elsewhere in this issue we publish a description of a small single-seater designed by the Air Navigation and Engineering Company, Ltd., of Addlestone, Surrey. For want of a better term we have referred to the machine as a "light plane," much as in the automobile world cars below a certain size and weight are termed light cars. We are not enamoured of the term, but the difficulty is to find a better. The term "glider" has already come to mean an aeroplane without engine, and obviously could not be applied to a machine fitted with an engine powerful enough to carry it to 25,000 ft.

The new design proves in no uncertain way what we have contended for a long time, that it is possible to design a machine with an engine of very low power, which will give quite a good performance, and at the same time be nearly as economical to run as a motor-cycle and side-car. The A.N.E.C. monoplane is estimated to do approximately 60 miles per gallon of

petrol, which is certainly not more than a large combination outfit consumes, while the light aeroplane travels at an average cruising speed of over 60 m.p.h., a figure which could not be maintained by road vehicles.

The possibilities of this type of aeroplane are practically unlimited. The cost should be so low as to be within the reach of very large numbers of private sportsmen, while in the colonies such a machine would be capable of very practical utilitarian—apart from sporting—use. As part of the training scheme for pilots the type also has a great future, and might well form a stepping-stone between the dual control and solo machine, or even between the glider and the first power-driven large aeroplane. We therefore look forward to a rapid development of the light aeroplane, both for pleasure and utility purposes, believing that this type of machine will be the means of getting actively interested in aviation many who would not otherwise have been in a position to afford the purchase and running of their own runabout.

• • •

### That Airworthiness Certificate

On more than one occasion we have referred, in the past, to the unfair handicap imposed upon the constructors of small aeroplanes, or rather aeroplanes having small engines. The minimum fee charged for an airworthiness certificate for a new type of aeroplane is £65, which is much too high for the majority of machines with engines under 100 h.p. In the case of the new type of machine, which we have referred to as a "light aeroplane," this fee is not only too high, it is quite prohibitive. As the cost of such a machine may be expected to be in the neighbourhood of £200 to £225, £65 added to it will make a very great deal of difference. We are well aware that this fee is demanded for the first machine only of a type, but even so it is excessive, and it is quite clear that when it was decided upon those who drew up the regulations did not foresee that some day we should have machines flying with engines of anywhere between 10 and 20 h.p.

We appreciate that the Director of Civil Aviation is a very busy man, and that this matter may easily have escaped his notice, but we do urge the necessity of giving careful consideration to the question, and feel certain that, once it is brought to his notice, our very energetic and fair-minded D. of C.A. will, if it be at all possible, see that a remedy is found, and that a type of machine which is only just beginning to be developed is not unfairly handicapped by a set of rules which obviously were drawn up with machines of the ordinary type in view. One reason why the fee should be capable of being reduced is that in the very nature of things such machines will have a reasonably high factor of safety, simply because it is practically impossible to reduce the material as much as the strength allows, as sections would be so thin as to appear at once flimsy, even to a man not trained in stress calculations. Special rules should, therefore, be applied to these machines, and simplified requirements which would allow of reducing the fee to £5 or £10 at the most.

In any case, the work of checking the stress calculations is not such a very specialised job as to require payment to the tune of £65, as will be realised when it is pointed out that this figure represents the work of a £500 a year man for six weeks. The methods have been reduced largely to a matter of routine work, and certainly would not occupy an experienced man for more than a couple of days.



# THE A.N.E.C. LIGHT AEROPLANE

## 20 H.P. Bristol "Cherub" Engine

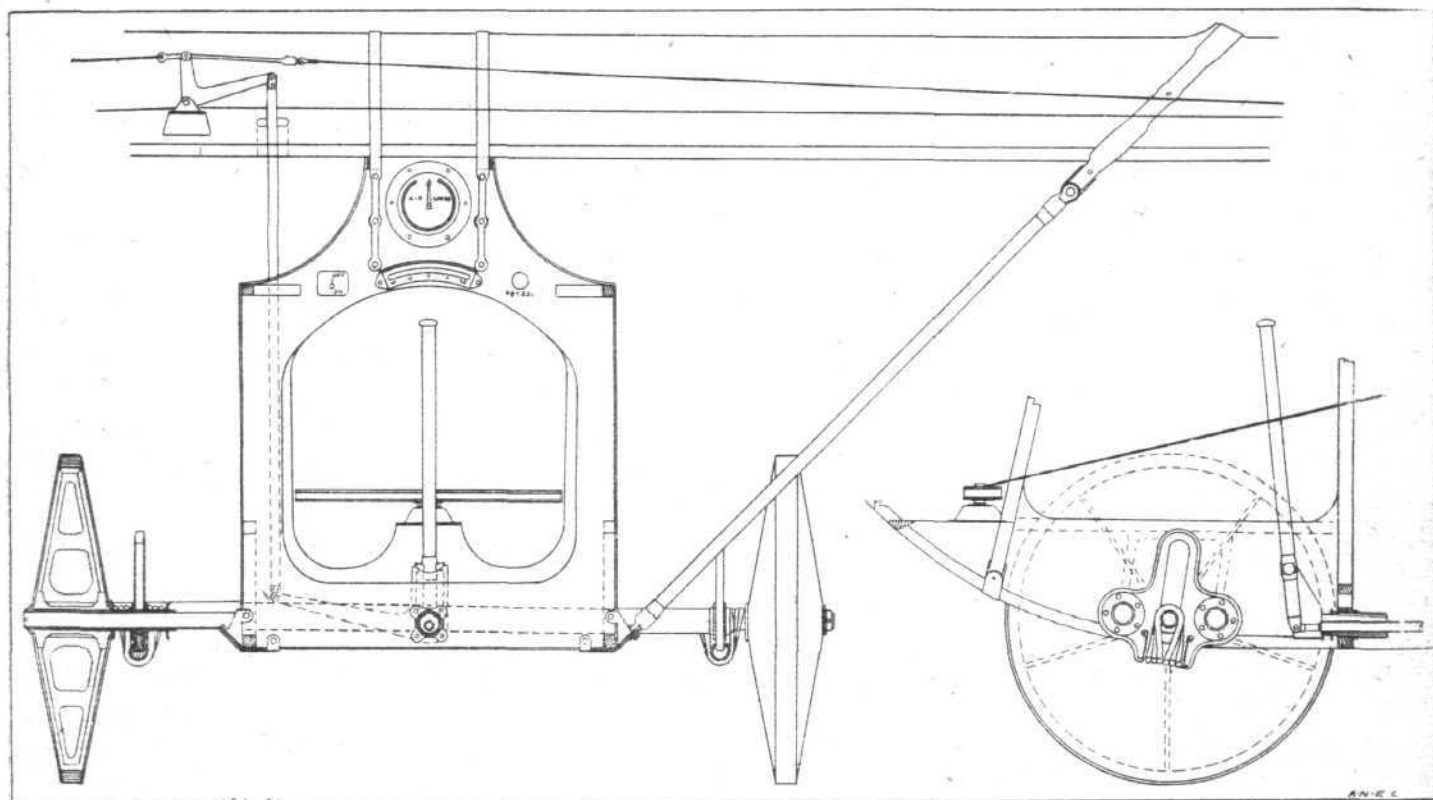
IN describing the Bristol "Cherub" engine (March 1, 1923) we stated that this low-powered engine promised really to "fill a long-felt want." We did not then anticipate the prompt attention which the engine would attract, and, consequently, it is the more gratifying to be able to record that the Air Navigation and Engineering Company, of Addlestone, Surrey, of which Mr. N. Chereau is managing director, has got out the complete designs for a small machine to take this engine. The designs are due to Mr. Shackleton, and, as the accompanying general arrangement drawings will show, the new little machine, which, for want of a better term we, describe as a "light aeroplane" (following motor-car practice of speaking of a light car), is of very pleasing lines indeed, and with its small overall size, and particularly low height (less than 4 ft.) could scarcely fail to appeal to anyone interested in aircraft.

We have had the privilege of going through the performance figures with Mr. Shackleton, and we are frankly astonished at the excellence of the aerodynamic design. Mr. Shackleton has evolved for this machine a special wing section, which

ceiling is attained. The machine would probably take something like three hours to reach the ceiling.

In external appearance the A.N.E.C. light aeroplane might, perhaps, be described as a Dornier built on a very much reduced scale. The high engine position, the parallel semi-cantilever wing, the short cantilever beams projecting from the floor of the fuselage and carrying the shock absorbers, and the general appearance are suggestive of the Dornier "Komet." We are not in any way accusing Mr. Shackleton of copying Dornier. It merely so happens that in combining the features which he has thought desirable he has arrived at much the same arrangement. Constructionally this small machine is, of course, entirely different.

The new A.N.E.C. monoplane incorporates in its construction several novel features, most important of which is, perhaps, the wing spar construction. In the past it has been customary to have two spars, placed a considerable distance apart. In the German gliders the single spar construction, strengthened by covering the entire leading edge with plywood, has gained much favour recently, as providing good

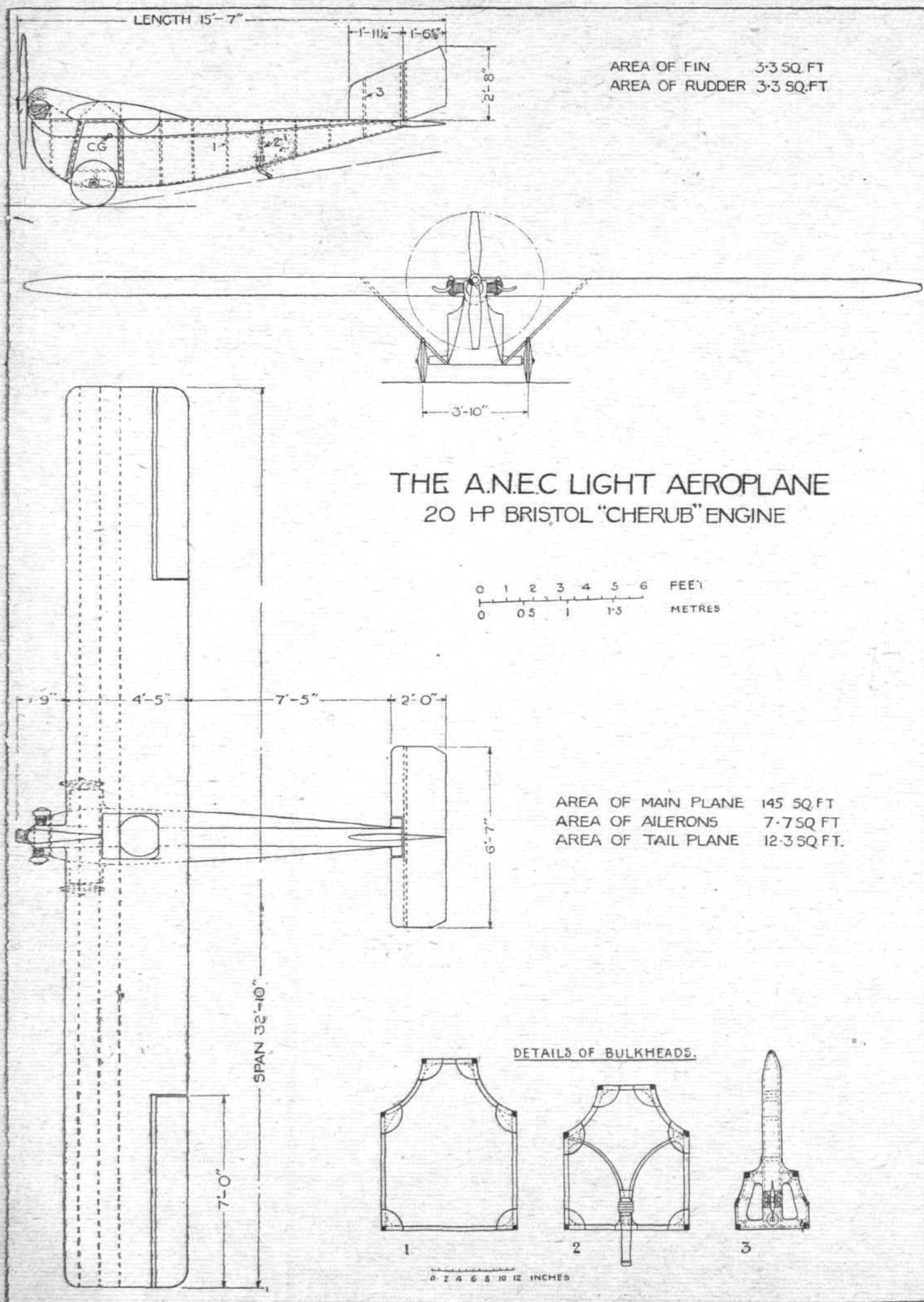


THE A.N.E.C. LIGHT AEROPLANE: Part-section through fuselage in way of pilot's seat, looking forward. Note the aileron control and the cantilever undercarriage.

in model form and not tested at a particularly high velocity, gave a maximum L/D of 22, while the maximum lift coefficient was somewhat above 0.65. By reducing external bracing and all extraneous parts to a minimum Mr. Shackleton has been able to bring the maximum L/D of the whole machine up to the very good figure of 16.5. The consequence is that, as the machine is light and lightly loaded very small power is required for horizontal flight, and the ceiling is correspondingly high. We mention this, not because a high ceiling is of any particular value in a machine of this type, but because the characteristics which give a high ceiling are the characteristics that are desired for other reasons in such a machine. It should not be assumed that because the ceiling is high the machine has a rapid climb. (As a matter of fact, the climb is sufficiently good, but not nearly so astonishing as the ceiling. The estimated climb to 3,000 ft. is eight minutes.) This will be appreciated when it is remembered that rate of climb is mainly a matter of light loading per horsepower, while high ceiling is chiefly attained by having a good excess of horse-power available over horse-power required, even if the power loading is somewhat high. Thus, in the case of this machine, the power loading (on 20 h.p.) is 22.9 lbs./h.p., which is a reasonably high figure, and yet the high

resistance to torsion. Mr. Shackleton has, in a way, combined the two systems, with a touch of Junkers multi-spar construction, in the new monoplane, and as this form of spar is, of course, applicable to other machines as well, its construction will be dealt with at some length.

Fundamentally the spar consists of three stringers, running across from wing tip to wing tip, and covered by three-ply wood. The apex of the triangle thus formed is at the top of the wing section, and the base at the lower surface. It might be objected that a better plan would have been to reverse the position, standing the triangle on its apex, and thus have got more material on the top of the spar, where, as regards the cantilever portion, the top is in compression. While this would be so the advantage would have been smaller than might be expected at first glance owing to the configuration of the usual wing section, i.e., approximately flat bottom and deeply cambered top surface. This would reduce the overall depth of the spar, and there might be little or no gain. On the other hand, the present arrangement has several practical advantages. Thus the flat bottom of the spar forms a very convenient base for attachment to the fuselage. With the pilot placed where he is, the slope of the rear spar wall materially improves the view in a forward and upward direction.



THE A.N.E.C. LIGHT AEROPLANE, 20 H.P. BRISTOL "CHERUB" ENGINE: General arrangement drawings, to scale.



Finally, the spar forms, with the three-ply covered leading edge, a member that is particularly good in torsion. It might be added that breaking tests have shown the moment of resistance to be such that the spar successfully withstands bending loads which impose a maximum fibre stress of 6,200 lbs./sq. in. In torsional tests the spar withstood a torque resulting in torsional shear stress of 800 lbs./sq. in. In both cases the moment of resistance was calculated on the total area of the cross section of the spar.

As regards details, the three corner strips of the spar are of spruce, and are tapered towards the tip in such a way that, while the overall size of the spar remains the same, the corner strips taper considerably. The same applies to a certain extent to the ply-wood covering, which is about 5/32 inch thick at the point of maximum bending moment, and only 1 mm. thick at the tips. The ply-wood is, of course, put on in panels, successive ones of which become thinner as the tips are approached. The ply-wood panels are attached to the corner strip by glueing and tacking.

The ribs are built up of grooved flanges of spruce, into which are let narrow strips of thin three-ply, the shape being maintained by distance pieces, having saw-cuts in their ends where these fork over the ply-wood web strips. The arrangement is shown in one of our sketches.

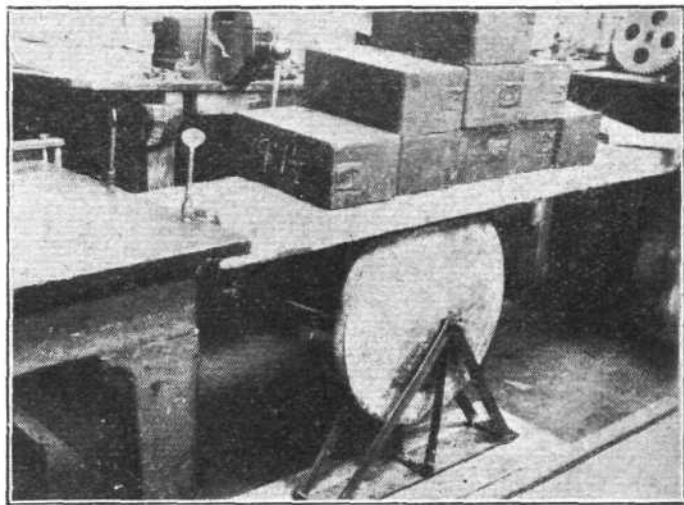
This form of spar construction would appear to be particularly applicable to metal construction, and we hope that the wider scope offered in this direction will be made full use of. We might add that the triangular spar construction has been patented by the Air Navigation and Engineering Company.

The fuselage is composed of a light framework covered with thin three-ply wood. The bulkheads are, in most cases, skeletons with gussets of three-ply wood where two or more members meet. Where local considerations demand, the bulkheads are of more solid construction, with internal struts and a covering of ply-wood front and back, thus forming a box. This is the case where the wing tubes attach and in similar places. At the rear of the fuselage these bulkheads are built up to form the vertical fin, which is thus virtually integral with the fuselage.

The pilot is placed in a low hammock seat, and a hole in the middle of the wing serves as a means of entering and leaving the cockpit, as well as for giving a better view. Reference has already been made to the fact that the sloping rear surface of the wing spar improves the view in a direction obliquely upwards and forwards. The "hollow-ground" deck of the fuselage facilitates looking directly forward of the machine, and altogether the view is probably as good as it is humanly possible to make it in a tractor machine.

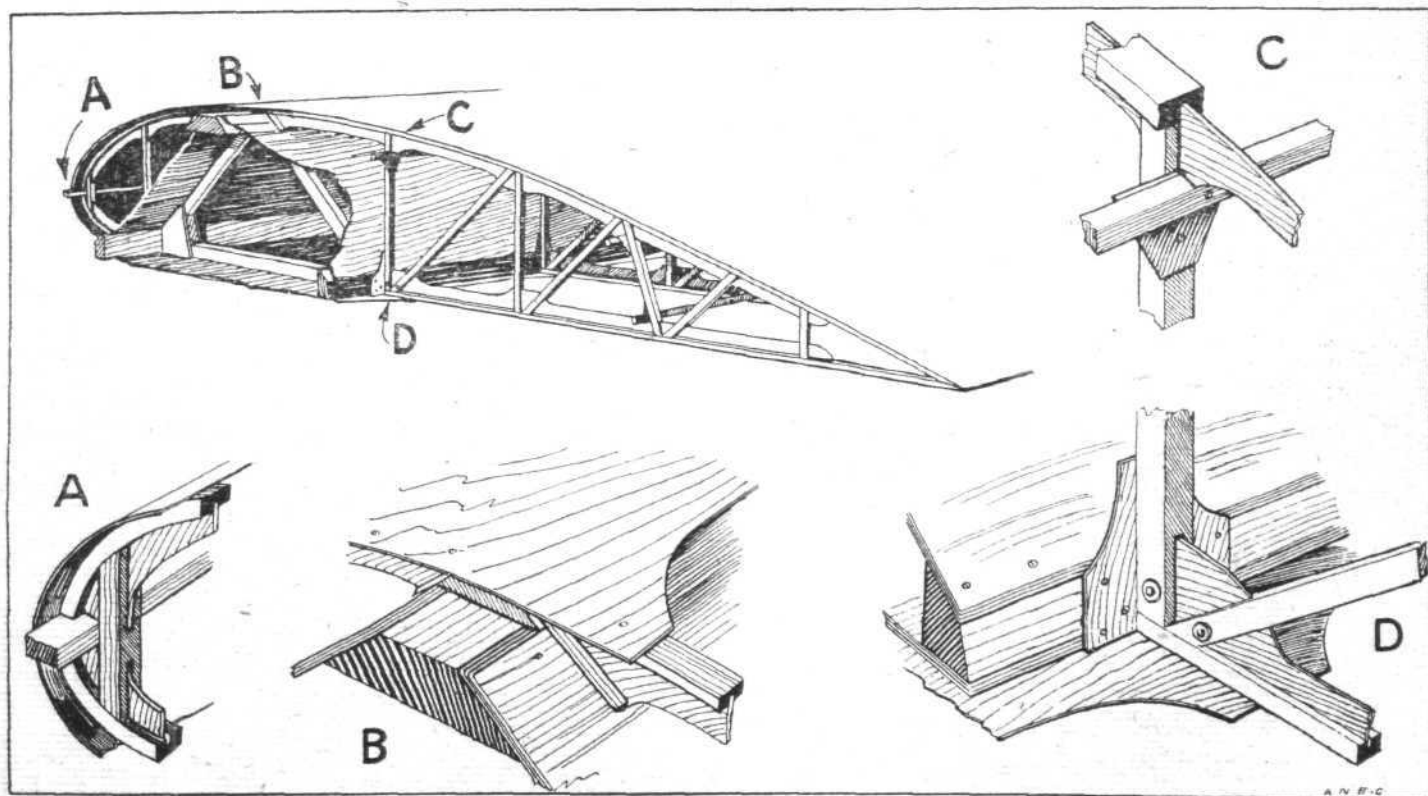
The undercarriage, as already indicated, consists of two wheels mounted on the usual tubular axle, but the rubber cord shock-absorbers of which are supported from the free ends of two tubular cantilever beams projecting laterally from the floor of the fuselage. On their ends these beams carry fish-plates having slots for the axle to work in, as shown in our drawings. The whole will be enclosed in a streamline fairing.

The wheels call for a somewhat detailed description, as they are of very unorthodox design. Mr. Shackleton frankly



The all-wood wheel of the A.N.E.C. Light Aeroplane under test. The load supported when this photograph was taken was over 1,000 lbs., and the wheel showed no sign of breaking. The weight of the wheel is 5 lbs.

admits that they are not his own invention, as wheels of this type have been made and tested in Germany. He has, however, improved on the construction, and has produced a wheel which, for a weight of 5 lbs., will support a tremendous load. On the day of our visit to the Addlestone works one of these wheels was being tested, and the accompanying photograph, showing the wheel under test, was secured by our photographer on this occasion. The load sustained when the photograph was taken was considerably over 1,000 lbs., and it is thought that the wheel will carry probably nearly



THE A.N.E.C. LIGHT AEROPLANE : Some constructional details of the wing. The spar is of triangular section, and is built up of three corner strips of spruce, joined under each rib by an internal triangle formed of thin spruce strips. The whole is covered with ply-wood. The entire leading edge is covered with ply-wood.

twice that load before collapsing. As the 1,000 lbs. give a factor of safety of 4, there is little need to worry about greater strength.

Constructionally the wheel is made of a rim of ash strip,



Mr. N. Chereau, Managing Director of the Air Navigation and Engineering Company, Ltd., and, on the left, Mr. Shackleton, the designer of the light aeroplane described in this article.

wound around a mould spirally, the ends being tapered down and the wheel turned later to make it perfectly true. Five "spokes" support the rim, and are secured to the rim and the hardwood hub by triangular fillets. The whole is then covered with ply-wood. A short phosphor-bronze bush is inserted in the hub at each end, and a leather strip is put around the rim to form a "tyre," and the wheel is finished. In view of the low weight, great strength, and cheapness of production, this form of wheel deserves to be more generally used on very light machines.

The controls are of more or less orthodox type, with the exception of the aileron controls. A short crank-arm projects laterally from the longitudinal rocking shaft, and from it a tube runs to an L crank inside the wing. From the other arm of this L crank cables run to the aileron king posts via large pulleys. The ailerons are of usual type, except that they are carried on a false spar, and are hinged at the lower corner instead of in the centre of the section.

The wing is built in one piece, and is attached to the fuselage by sheet-steel stirrup strips passing over the triangular spar. Externally the wing is braced by two struts on each side. These struts, which are of tubular section, are attached to stirrup strips passing over the spar, and are prevented from sliding along the latter by a triangular block of wood, bevelled to accommodate the slope of the struts.

As already stated, the engine is a Bristol "Cherub" of 20 h.p., mounted high in the nose of the fuselage, and driving, through a two-to-one reduction gear, a two-bladed tractor airscrew. The high engine position (which is not objectionable in such a small machine, owing to the relatively unimportant forces set up) has allowed of getting ample clearance for the propeller, while at the same time keeping the machine very low on the ground. In fact the pilot could, without difficulty, step straight from the ground into the cockpit.

Owing to the high position of the engine, and the fact that in the Bristol "Cherub" the carburettor is placed above the engine, it has not been possible to provide gravity feed. This seems a great pity, as gravity feed is almost essential in a simple, cheap machine.

The main characteristics of the A.N.E.C. light aeroplane are as follows: Length overall, 15 ft. 7 ins. Wing span, 32 ft. 10 ins. Overall height (with propeller horizontal), about 4 ft. Weight of machine empty, 273 lbs. (composed as follows: Engine and propeller boss, 86 lbs.; propeller, 10 lbs.; wing and struts, 90 lbs.; fuselage, 40 lbs.; tail unit, 12 lbs.; undercarriage, 17 lbs.; controls and instruments, 12 lbs.; tanks and connections, 6 lbs.). Weight of fuel, 30 lbs. Pilot, 155 lbs. Total loaded weight, 458 lbs. Wing loading, 3.15 lbs./sq. ft. Power loading, 22.9 lbs./h.p. Maximum speed, 78 m.p.h. Cruising speed, 66 m.p.h. Landing speed, 32 m.p.h. Fuel consumption, one gallon per 60 miles. Climb to 3,000 ft. in eight minutes; to 12,000 ft. in 52 minutes. Ceiling, 25,000 ft.

The estimated maximum speed is somewhat high, but Mr. Shackleton informs us that this occurs at an angle of incidence of -4 degrees. In consequence the machine would probably be somewhat unpleasant to fly, and pilots would not be tempted to be flying always "all-out." That, we think, is a good feature, and should result in better engine reliability and increased economy. Another feature of the machine which should make for safety is that the wing section used, although being of fairly deep top camber, does not show a sudden break in the lift curve at stalling angle, the curve dropping very gradually. Thus it should be difficult for a somewhat inexperienced pilot to stall the machine violently and thus getting into a spin or nose dive. The factor of safety is high throughout, and stress calculations indicate that it should be practically impossible for a pilot to break any part in the air. Thus, even if the wing struts on one side should break (a very unlikely contingency), the wing structure should, according to the stress calculations, still be strong enough to hold together and thus enable the pilot to make a landing.

With a landing speed of about 30 m.p.h. and a wing loading of only just over 3 lbs./sq. ft. it should be possible to put the machine down in almost any small field, especially as the tail skid is mounted some distance forward of the tail, and thus should act as a fairly effective brake and pull the machine up quickly.

For sporting purposes there can be no doubt that a machine of this type should have a very wide appeal, and we hope that more than one will take part in the point-to-point race for the Grosvenor Cup on June 23. The possibilities of the type do not, however, finish here by any means. For instance, it is not difficult to imagine a number of such machines being used for training purposes, forming a stepping-stone between the glider and the larger power-driven machine. Thus, one can visualise a system of training whereby the pupil starts on a glider, proceeds to a light aeroplane, then to a fairly low-power machine of more orthodox type, and finally to the fast fighter and scout. Another field of utility would be their use as messenger 'planes for the R.A.F. There is very frequently a necessity for sending communications from one station to another, and instead of using an expensive machine burning a lot of petrol, these small machines could very well be used, the cost being negligible. A few might be stationed at Croydon, Stag Lane, etc., for use by Air Ministry officials when visiting various stations.

In the Colonies the type should be particularly useful as runabouts. There must be thousands who live far from towns, such as ranch owners, etc., who would be glad to use such a small, cheap machine.

Altogether, we think Mr. Shackleton and the Air Navigation and Engineering Company (which, we are glad to learn, is now entirely under British control) are to be congratulated on a very promising and clever design, and we shall hope to see large numbers of these machines take a prominent part in sporting aviation during the next few years.

#### International Air Congress, London, 1923

GROUP-CAPTAIN H.R.H. THE DUKE OF YORK, K.G., R.A.F., who is President of the International Air Congress which is held in London during the last week of June, has signified his intention of being present at a reception of the Members of the Congress on Monday evening, June 25. The Right Hon. the Lord Mayor of London will hold a reception for the Members of the Congress at the Mansion House, from 9-11 p.m., on Wednesday evening, June 27.

#### "Facts About Flying and the Civil Uses of Aviation"

With a view to acquainting the younger generation with

the essential facts relating to the air, an excellent pamphlet under the above title, has been published by the Air League of the British Empire. This work has been compiled from material supplied by the Directorate of Civil Aviation, Air Ministry, and deals with the following subjects: Early History of Flying; How an Aeroplane Flies; Learning to Fly; Air Line Organisation; Flight in an Airship; The Development of Aircraft and Imperial Necessity; Famous Routes Already Flown; and, in conclusion, a Bibliography. It is intended that copies of this pamphlet should be circulated throughout the Primary and Secondary Schools of Great Britain.



# THE ROYAL AERO CLUB OF THE U.K.

## OFFICIAL NOTICES TO MEMBERS

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### GROSVENOR CHALLENGE CUP

The 35 h.p. Green Engine has been added to the list of engines eligible for this race. In publishing the list in last week's issue, this engine was omitted by an oversight.

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN Secretary.

### The Royal Air Force Reserve

In our issue for February 15 we referred to the arrangements being made in respect to the formation of a Royal Air Force Reserve for Officers. We now learn that, whilst there has been a good response from London, that from the provinces has been somewhat disappointing. The reason for this is probably due to the lack of publicity of the proposals announced by the Air Ministry on this subject. An effort is being made, however, to make these more widely known outside London, and it is hoped that the vacancies will then soon be filled. We understand that some 200 officers are required for the three following areas: 60 for Bristol, 60 for Coventry, and 80 for Scotland (Glasgow).

Some modifications have been made in the original proposals, the most important of which consists of the setting up of a travelling Selection Committee and a Medical Board, which will meet at Glasgow, Leeds, Birmingham, or Bristol should sufficient candidates be forthcoming. Special rates have also been approved of disability retired pay as follows:—

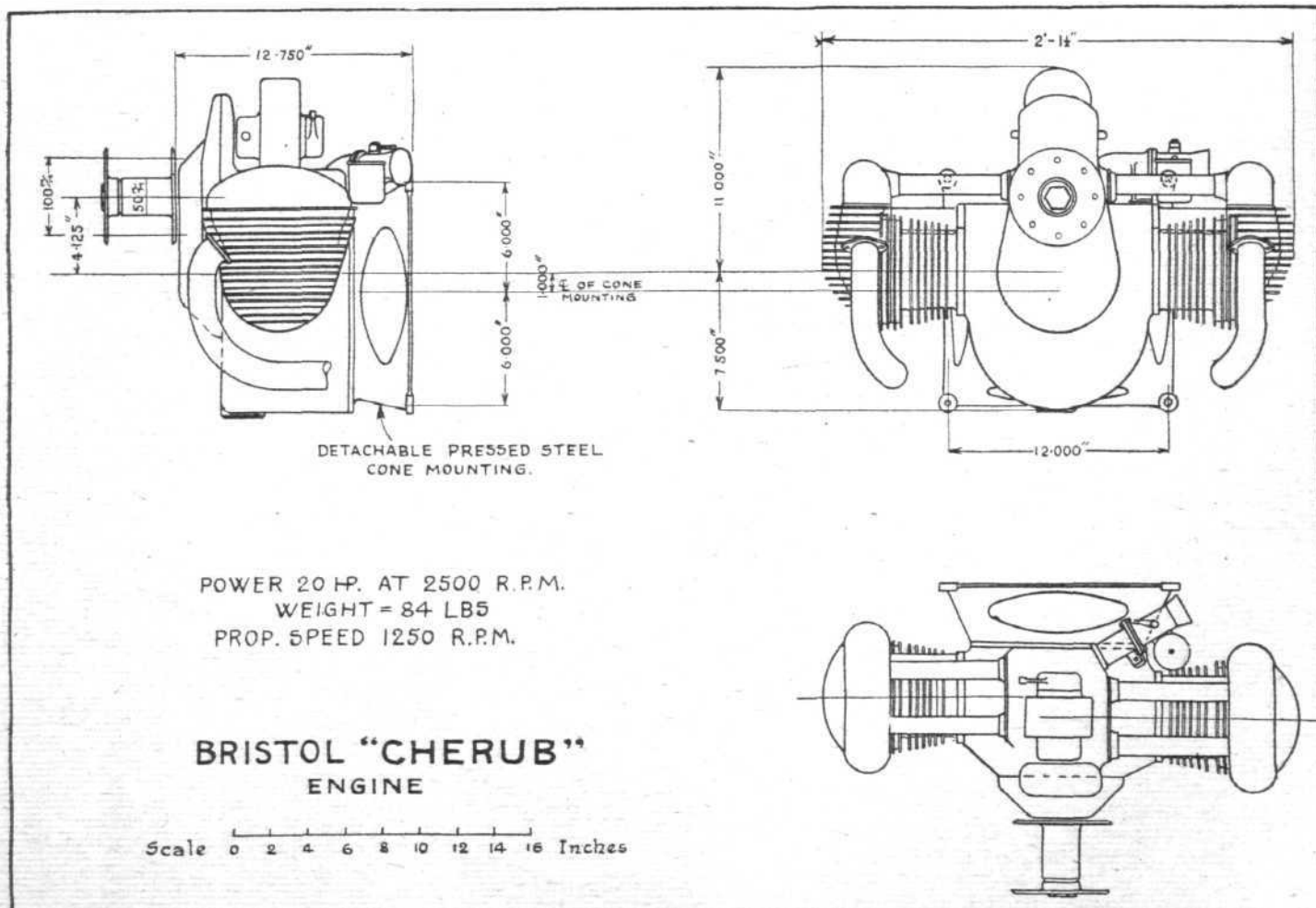
(Note.—These rates will be subject to reduction at the discretion of the Air Council in the event of the cost of living falling considerably below the level at which it stood in October, 1921. Such reduction, if made, will apply to retired pay which is being drawn at the date of reduction as well as to subsequent awards.)

Degree of Disability.	Pilot Officers.	Flying Officers.	Flight Lieutenants.	Squadron Leaders.	Wing Commanders.
Not less than:	p.an.	p.an.	p.an.	p.an.	p.an.
100% ..	150	160	175 0	200	250
90% ..	135	144	157 10	180	225
80% ..	120	128	140 0	160	200
70% ..	105	112	122 10	140	175
60% ..	90	96	105 0	120	150
50% ..	75	80	87 10	100	125
40% ..	60	64	70 0	80	100
30% ..	45	48	52 10	60	75
20% ..	30	32	35 0	40	50

Provision is also made for pensions to the widows and allowances to the children, etc., of officers of the R.A.F. Reserve killed on duty or dying as the result of wound or injury received on duty.

For the convenience of those engaged in business arrangements have been made to split up the period of training, which is two months at the school, so as to enable officers to attend to their private affairs.

In conclusion we would point out that the immediate demand is more for pilots, as it is not intended to enter many officers in Classes B or BB (Technical officers) before the autumn.



Installation diagram of the Bristol "Cherub" engine described in our issue of March 1, 1923. The engine here shown is the geared-type, and is slightly different from the direct-drive engine previously illustrated.

## WING RADIATORS

A RECENT development—and, it would seem, a very important one—in aircraft construction, which played a by no means small part in the successes of the last two world's speed records—that obtained by Gen. Mitchell in October last and Sadi Lecointe's successful effort to beat it—is the wing-type radiator. Various attempts have been made by designers, for some time past, to produce such a radiator, but it cannot be said that the results obtained were highly satisfactory. The first really successful effort in this direction is claimed by the Curtiss Aeroplane Company, who, after much experimenting, perfected a wing radiator, and used it with striking success on four of their machines in last year's Pulitzer Trophy Race. Since then other wing radiator systems materialised—notably, that used on Sadi's Nieuport, details of which we have not as yet received. A few notes on the Curtiss system may be of interest.

The wing-radiation system, by eliminating the strong head resistance of the ordinary automobile type of radiator, increases the speed of a machine fully 20 per cent. A device connected with the wing radiation serves to regulate the temperature of the oil. One of the problems in pursuit work in the past has been the difficulty of warming up the engine in cold weather. In the ordinary type of machine, it was some-

of the time heretofore required, and a pursuit 'plane is able to leave the ground within a few seconds after orders are received.

This wing-covering type of radiator was first conceived and designed by the Curtiss Company for use on 1920 Gordon Bennett racing machines, but due to lack of time for testing properly it was decided not to attempt their use. During 1921, two Curtiss type wing radiators were made up and flown on a "C.6" motored Curtiss Oriole plane. These radiators had a total radiating area of approximately 84 sq. ft., which was equivalent to .454 sq. ft. per b.h.p. They weighed 37 lbs. each; which was equivalent to .88 lb. per sq. ft. of radiating surface, and the water content was 16 lbs. each, which was equivalent to .38 lb. of water per sq. ft. of radiating surface. Trouble was experienced with these radiators both through lack of sufficient cooling area and faulty construction. Both finally failed and were discarded.

Two new radiators were made during January, 1922, with 50 per cent. increase in cooling area. The first was made by the same method as the original pair, and when completed weighed 50 lbs. (.794 lb./sq. ft.) and contained 17 lbs. of water (.27 lb./sq. ft.). The second radiator was made by a new method, designed to overcome difficulties encountered in original method. Each strip of radiating section was built and tested separately before assembly with radiator proper. This radiator weighed 48.5 lb. (.77 lb./sq. ft.) and contained 14.5 lb. (.23 lb./sq. ft.) of water.

During a test flight the first new radiator failed in the same way as the original radiators, and a third new radiator had to be built. This radiator was built by an entirely new method in an attempt to save weight and simplify construction. The header construction method of soldering and method of assembly were changed, and a radiator produced that only weighed 43 lbs. (.682 lb./sq. ft.) and contained 12.8 lbs. (.203 lb./sq. ft.) of water.

These radiators (second and third) were flight-tested on a Curtiss Oriole machine, with C-6-A motor, from January 24, 1922, to June 16, 1922, during all kinds of weather conditions, and all performances were carefully recorded. During these flights a maximum altitude of 15,500 ft. was attained, and an air temperature range from 2° F. to 80° F.

During these tests, it was found very difficult to remove all air from the water system when filling, this air eventually finding its way into the water jackets of motor and forming steam pockets, which ran up pressure on the system so rapidly that the vents were unable to relieve it, and as a consequence the radiators were blown up. This trouble was finally overcome by installing a spring safety valve of large area in the water header.

From the performances obtained with the wing radiators on the Curtiss Oriole, it was decided to use them on the Curtiss Army racers if an aerodynamic test in the wind tunnel corroborated the belief that their air resistance was negligible. Accordingly tests were run in the Curtiss wind tunnel at Garden City on various sections, and at different velocities, and it was found that there was practically no increase in drag at all over wings without radiators. Curtiss wing-type radiators were accordingly installed on the Army racers, and later on both of the 1921 Curtiss Navy racers, which formerly were equipped with another type radiator. As a check on their efficiency, the 1921 Navy Racers with best previous type radiators made 186 m.p.h., and with Curtiss wing-type radiators made over 200 m.p.h. The performance of the Curtiss machines in the Pulitzer Trophy Race, when they took first, second, third, and fourth places, is the measure of their value.

From data on all Curtiss wing-type radiators made to date, the weight per sq. ft. of cooling area will average between .6 and .68 lb. and the water content will average about .2 to .23 lb.

Experiments are now in progress which, it is expected, will reduce the weight per sq. ft. to approximately .50-.55 lb.



**WING RADIATORS:** Two successful types of wing radiators—the Curtiss (top) and that fitted to Sadi Lecointe's Record Nieuport-Delage.

times found impossible in cold weather to get under way in less than 20 minutes. Such a delay, when an attack is imminent, is a serious handicap. The oil radiator, developed by the Curtiss Company, warms up the engine in a fraction

### Appointments to New Aircraft Carriers

COMMANDER A. W. BROOKS, D.S.O., has joined the aircraft-carrier *Eagle*, which is to complete this summer the extensive alterations which have been made to her at Portsmouth Dockyard. Commander Brooks served in 1920-22 in the Department of Naval Equipment at the Admiralty. His appointment to the *Eagle* follows that of her commanding officer last month, Captain G. O. Stephenson, C.M.G. To the other new aircraft-carrier, the *Hermes*, Captain the Hon. Arthur Stopford, C.M.G., Lieut.-Commander R. K. C. Pope, D.S.O., has been appointed.

### A Curious Story

OUR French contemporary, *L'Aero-Sports* of March 24, contains a curious story relating to the Senegalese boxer Siki. According to the French journal, Siki is virtually a prisoner in Dublin, the British Government having refused him permission to travel across the Kingdom on his way home. He is alleged to be awaiting the arrival at Queens-town of a steamer from New York, which will call on her way to Cherbourg. Siki's manager is stated to be attempting to get a French aeroplane to fly to Dublin in order to "collect" Siki and his wife. Truly a curious story.



# AVIATION IN THE HOUSE OF LORDS

ON Wednesday, March 21, British air policy was discussed in the House of Lords, when the Air Estimates, 1923-24, came up for debate. The general feeling was one of uneasiness and dissatisfaction with the manner in which this country has lost its leading position in the air, even to the point of being inadequately prepared for home defence.

The EARL OF BIRKENHEAD, in calling attention to the relative air-strengths of France and Great Britain, said the question was one of the utmost public importance, which had changed its aspect very largely in the last few years and indisputably in the last few months. It would be extremely unfortunate if the importance of the matter was in any way obscured by a tendency to recrimination. We were the first country in the world, after the Armistice, to give a pledge of our conviction in the coming peace by dissolving, almost as rapidly and magically as we had created them, the great armies which had played so great a part in the common victory. The consequences today were well known. The peace-time establishment contemplated as permanent by the French nation was more than twice the peace-time establishment of the British army. Now we, who were the first to reduce the army, had exhibited to the world, in the words of the First Lord of the Admiralty, a signal act of faith in relation to the navy, in that we, alone of the signatories to the Washington Treaty, had carried out the obligations to which we signed our name conditionally on the co-signatories equally discharging their undertakings; but he confessed he had less anxiety in this connection.

Four years had passed since the Armistice. We had not gained one yard in the direction of that European settlement, and the re-attainment of tranquillity on the Continent of Europe, which was the dearest hope of every one four years ago.

There was no sensible Englishman or Frenchman who did not realise the immense and permanent disaster to the Continent of Europe if it were found to be impossible to restore the harmony which had existed. But we had a duty to our own people. It was vitally important to everybody who had any responsibility for the security of these islands to consider that security in the terms of the new diplomacy and not in the terms of the old.

Turning to the question of air strength, Lord Birkenhead quoted the figures given by Sir Samuel Hoare on the relative strengths of French and British Air Forces. As these have already been published in *FLIGHT*, they are not repeated here. They disclosed, he said, an alarming state of affairs. Continuing, he said that, just as in the past they could not claim security for the people of this country unless our Fleet was adequate, so today they would be entirely lacking in their duty to the country unless they were able to afford them the guarantee of a sufficient Air Force to defend them from attack. There was no case here for offence on the part of any other Power. It had been said that there were great German air preparations going on at this moment. He was informed by officers who had recently had an intimate knowledge of Germany that these statements were most grossly exaggerated, and that there was no German air menace during the next two years at any rate, nor could there be any air menace from Germany combined with Russia. If that was true, the situation became even more alarming. He did not suggest that any change could be made this year, but that the Government ought to do something considerably more than they were doing at present he was quite satisfied. This country could no more be content during the next three, four, or five years with a position of inferiority in the air than it would have been content with naval inferiority prior to 1914. Nothing less than a one-Power standard was safe, and it was in terms of safety alone that Governments and Empires existed. On what possible basis could it be said that we should be content with less than a one-Power standard in the air? While he would make any sacrifice to maintain French friendship, which was necessary to the civilisation of Europe and the reconstruction of the world, he did not believe that it would be found possible for any Government in this country to accept any standard in the air lower than one which was at least equal to that of any foreign Power.

The DUKE OF SUTHERLAND, Under-Secretary of State for Air, said that Lord Birkenhead had correctly stated the number of British machines, but his figures in regard to French machines were not quite accurate. According to their latest information the corresponding French figures were 140 squadrons mustering 1,260 machines. Of those 111 squadrons were at home and 29 overseas. The number of British squadrons at home at the present moment were ten, and would be 14 but for the fact that four were at present at

the Dardanelles. By 1925 the British machines would number 575, against the French strength of 2,180, on the assumption that no alterations were made in the programme of expansion, which had still to pass the French Chamber and Senate. The strength of the British personnel was approximately 29,000 all ranks. It was not possible, however, to give the comparable French figures on the completion of the programme of expansion, but the combined strength of the French military and naval air services was approximately 38,000.

If the present Cabinet decided that in their view the axiom accepted by the Coalition Government that it was unlikely that there could be a major war for ten years from 1919 no longer held good, and if the Committee of Imperial Defence, which was now reviewing the whole subject in every light, also held the same view, and that the present circumstances warranted a larger Air Force, then quite possibly a larger Air Force would be raised. If it was decided to adopt a one-Power standard with France it would mean an increase on the Estimates for 1923-24 of about £5,000,000, but that would eventually be increased to £17,000,000 per annum in order to keep pace with France, if she continued to expand as at present proposed. With the increase of £5,000,000 it would mean a total expenditure of £23,000,000 for next year, in addition to a possible capital expenditure of £15,000,000. It would in that case be necessary to see where reductions could possibly be made in other services. Furthermore, three-quarters of the total French Air Force was kept at home in France, whereas two-thirds of our squadrons had to be kept permanently overseas.

From the point of view of national security, another important factor was the keeping alive and encouragement of the aircraft industry in this country, so that in the event of war, an immediate expansion could be made of the number of machines required for military service. This was only possible by encouraging civil aviation, by the standardisation of types of machines, and by large orders for military machines in the immediate future. The encouragement of civil aviation would also help from the military point of view to the extent that the pilots who took part in civil aviation would be asked to join the new reserve that was being formed of military pilots. Opinions differed on the point of whether passenger machines could in time of war be adapted for bombing and other military purposes. They could undoubtedly, to a limited extent.

France felt at the present moment that she was fully justified from her point of view in having a large Air Force as a first line of defence against an air attack upon both herself and Britain on the part of a Russo-German combination in the future. While our policy was still to remain in Iraq, Palestine and the Near East, it was undoubtedly cheaper to control those countries from the air than by the Army. The foundations we had laid down, and which were necessary for the building up of our present modest force, would, with comparatively slight additions, suffice to support a force two or three times its present dimensions. If we raised our Air Force to a one-Power standard on the basis of the present French strength, we should have to face immediately a total expenditure of £23,000,000 a year, while if and when the full French programme was carried into effect that figure would have to be increased to a total of £35,000,000 per annum. He was very glad that the Committee of Imperial Defence were inquiring into the whole problem, so that they could be satisfied, before increased expenditure was undertaken, that it was really necessary for the safety of the Empire at the present time, when the need for the utmost economy was so imperative.

VISCOUNT HALDANE said that on the main question he confessed the noble duke had left him somewhat uneasy. The position which we were in was a position which seemed to him to be inadequate so far as home defence was concerned. The British Navy was still probably the most powerful Navy in the world, and it was permeated by a spirit of victory which was worth many ships. The problem of home defence was a special one, and we needed to pay close attention to the question of defending ourselves against short-range air attacks on London. He did not think that France dreamt of war with us, but at the same time he was keenly aware of the possibilities of changes and sudden emergencies, and we must be prepared for these. He was not worried about either the Army or the Navy, but he did worry about the need of a defence force, and it was on this subject that concentration should take place.

LORD CARSON, after thanking the Earl of Birkenhead for bringing about the discussion, said he was sure that the noble earl, in making a comparison of our Air Forces with those of France, had no feeling of hostility towards that country. He felt a great deal of disappointment at the statement of the



Duke of Sutherland, who had not really challenged the statement of Lord Birkenhead. Nothing filled him with more alarm than the vast reductions in our naval programme. He believed now we had reached a point when naval safety was a *minus* quantity. If a war took place they would find themselves at a loss to organise within a reasonable time a Navy under the new conditions, and if these reductions in the Navy were to be made they must satisfy their conscience by strengthening another arm of defence. He hoped that the pre-War system, under which the Air Forces connected with the Army and Navy were kept separate, would be restored.

VISCOUNT LONG said the whole force and pith of the noble duke's reply was to be found in his closing words when he stated that to make the Royal Air Force comparable with that of France it would be necessary to spend £23,000,000. He believed a very great mistake was made when it was determined to set up a separate Air Force. It certainly had not led to economy. It was clear that in the present financial condition of the country we could not find the extra millions necessary to attain a one-Power standard. The alternative surely was to review the whole situation. Referring to the Committee of Imperial Defence, he said men were on it who, neither by force of their official position nor their own training, were the least fitted to give advice on these great questions. What they wanted was a small and powerful body.

VISCOUNT GREY OF FALLDON said that the question raised in the motion was one of the defence of this island, and more particularly of its vital part—London. The motion did not raise wide questions of imperial defence, but it did raise the very vital question of the defence of the heart of the Empire. So long as we were in doubt about our safety at home it became more and more imperative that we should reduce our commitments abroad. He did not propose to discuss our relations with France, except to say that he hoped it was generally recognised in France that, whatever might be the case at the moment, in the long-run French security depended on friendship with Great Britain. He wished it were more usually recognised in this country that our security under modern conditions depended on friendship with France to a degree never before known.

The question of our home defence raised a subject with which we had never had to deal before, and which could not be met by the old axiom of the supremacy of the Navy only. There was the problem of the safety of London. Air Forces were something which could be put into operation immediately. An attack did not require weeks of preparation, but could be absolutely sudden. He had listened to the debate with a feeling of great uneasiness. Lord Birkenhead's speech con-

tained some grave statements as regarded our present position to which he saw no answer.

Armaments would not prevent war; they would lead to future wars. This was a very critical year. What was now going on on the Continent, and causing them so much anxiety, would show during the next few months whether we were travelling towards security in Europe or away from it. He was not without hope that a successful issue might be found out of the present position through the strength of a general hope of future peace and a general sense of security. But the time was getting short, and unless a greater sense of security in Europe tended to a general reduction in armaments, it would be impossible for any Government in this country to hold its position unless it could show that as regards aircraft we were in a position to secure the defence of vital parts of the country against any possible attack. He trusted that the Government were having the whole question investigated, and that they would be able in course of time to show on the best expert advice what the real position of the country was with regard to air defence, and particularly the defence of London.

The MARQUESS OF SALISBURY said that although no one could underestimate the vital necessity for economy they could not allow any question of economy to interfere with the necessary provision for our responsibilities in connection with air defence. While they hoped that the nations of Europe would proceed further in the process of disarmament, they must take facts as they were. He did not think that there was any necessity to consider the situation in any tragic spirit. The Government were perfectly able, if the country wished it, to put all these matters right. Our population was singularly adapted for making and manning a great air force, if such should be decided upon. The matter had been referred by the Prime Minister to the Committee of Imperial Defence for enquiry, and the Committee had been strengthened for the purpose by the addition of Lord Balfour and Lord Weir. The Committee had already had two sittings. The degree to which the Navy was not now so all-important as it had been, and must be supplemented by the Air Force, and the standard of the new Air Service itself, formed an essential, and perhaps the principal, part of what the Committee had to consider. The relations in detail between the Air Force and the Navy had already been prominently before the Committee. He must ask their lordships and the country in this respect to trust the Government. No time would be lost. The Government hoped, within a relatively brief period, to announce the result of their deliberations, and to obtain, as he was sure they would, the support of all sections of opinion in Parliament.

## PRIZE DESIGNS FOR AIR MAIL STAMPS

We are indebted to Mr. F. J. Melville, Editor of the *Stamp Lover*, for the following particulars and illustrations relating to an interesting competition just closed for the best designs for a proposed air stamp, for use on letters carried by British air mails. This competition was organised by the Executive Committee of the London International Stamp

judges' decision, and the first prize amounted to 20 guineas and the second prize 10 guineas.

A large number of excellent designs were sent in, and the judges had no easy task in deciding the winners. The first prize has been awarded to J. Bickerton Sefton for two designs, "Acanthus Leaf," and the second prize is divided between



**PRIZE DESIGNS FOR AIR MAIL STAMPS:** Left, the two designs submitted by J. B. Sefton ("Acanthus Leaf") which won first prize. Right, the two designs which tied for second prize, submitted by H. Cousins ("Chaitya") left, and H. G. Andrews ("Albion") right.

Exhibition (which opens in May), and the judges included Sir Bertram Mackennal, K.C.V.O., the eminent sculptor, Mr. Stuart de la Rue (chairman of the well-known stamp printing firm), Mr. G. W. Stonestreet, C.B.E. (Inspector of Stamping, Somerset House), and Mr. F. J. Melville. Designs were to be submitted under a *nom de plume*, the names and addresses of the competitors being kept in sealed envelopes until after the

the designs submitted by Henry Cousins ("Chaitya") and H. C. Andrews ("Albion"). These designs are shown in the accompanying illustrations, and we hope next week to publish a selection of some of the other designs submitted.

Mr. Sefton's "Mercury" design is to be printed in sheet form in the Model Stamp Factory forming one of the chief attractions of the Exhibition above referred to.

### Air Mail Stamps and Correspondence

THE Editor of *FLIGHT* invites correspondents throughout the world to send him letters (addressed to 36, Great Queen Street, Kingsway, London) by their national or local air

mails. These will have special and personal acknowledgment in the Editorial columns of *FLIGHT*, and help to encourage the more general use of the air for mail carrying. Air Mail news items would also be appreciated.



## LONDON TERMINAL AERODROME

Monday evening, March 26

PASSENGER traffic, especially on the Paris and Cologne routes, is still on the increase. In fact, Handley Page have so many passengers these days that they have great difficulty in dealing with their goods traffic, and have resumed their Sunday service. On the Cologne route passengers increase steadily, while between Manchester, London, and Amsterdam, it will shortly be necessary to double the services at least.

The date for the opening of the Berlin service has been provisionally fixed for April 16, but this will depend on the negotiations between the British and German Governments as to permission to run the "D.H.34's" over Germany and for the German machines to land here. It is probable that at first the Daimler machines will run as far as Amsterdam as at present, and the German Aero-Lloyd will run the Amsterdam-Berlin section. There will, of course, be increased services between London and Amsterdam by both the K.L.M. and the Daimler Company.

### Countess of Carnarvon's "Air Special"

THE COUNTESS OF CARNARVON made a plucky attempt to reach her husband—ill at Cairo—by air on Monday. Upon receipt of the telegram announcing the Earl of Carnarvon's illness, the Countess immediately got in touch with the Daimler Airway, who arranged for a special "D.H.9" with the De Havilland Hire Service to take Lady Carnarvon and a specialist by air to Egypt. They left Croydon shortly after 4 p.m. on Monday, but by the time they arrived at Beauvais, the Countess, who had never been in an aeroplane before, was so ill that the pilot, Capt. Barnard, was compelled to descend, and his passengers travelled on to Paris by rail. The specialist continued as far as Lyons by air, but on arrival there news was received that Lord Carnarvon was much better, so the machine returned and Lady Carnarvon continued her journey by boat and train.

Mr. Courtney, who has been busy on test work for some time, is now acting as pilot for the Daimler Airway, in the absence of Mr. Hinchcliffe, who is off flying for the time being owing to

illness. There is no truth in the persistent rumours that he has left the Daimler Company, his absence being due entirely to indisposition, which prevents him flying.

### New Test-Pilot for Gloucestershire Company

MR. LARRY CARTER is to join the Gloucestershire Aircraft Company as test pilot at the beginning of the next month in place of Mr. Jimmy James, whose contract with that Company is at an end. Mr. Carter will find it a big change from the Handley Page "W.8's" to some of the new record breakers which, it is rumoured, Mr. Folland has in hand; but those who saw him win the Aerial Derby handicap on the little Bristol monoplane last year will not be surprised to see Mr. Carter win back for Britain some of the world's speed records.

During the week an experiment was to be made in flying to Croydon mails from liners which put in at Plymouth, but owing to the fact that the aerodrome at Plymouth is not licensed, this was abandoned at the last minute. Some misapprehension exists as to the reason for this, the true facts being that the Air Ministry had no objection to the machine using the aerodrome, as it was not carrying passengers, but the Insurance Company refuse to allow the machine to use an unlicensed aerodrome, no matter how good it is. This is one more case showing clearly the handicap insurance is to aviation, and one of the benefits which should accrue from the new scheme for one big company is that it will probably rule out the insurance companies and form an insurance "pool" of its own—as the de Havilland Hire Service has done—and thus end the hampering restrictions which the present insurance methods impose on aviation.

Mr. Davis, who was C.A.T.O. at Lympne, and has for some time been one of the C.A.T.O.'s at Croydon, is leaving to take up a position which, I understand, is not connected with aviation, and his place has not as yet been filled. Mr. Game, who was so long with "Airco," and then with Instone's, has left the latter firm, and the aerodrome does not seem the same without "Daddy's" familiar figure.

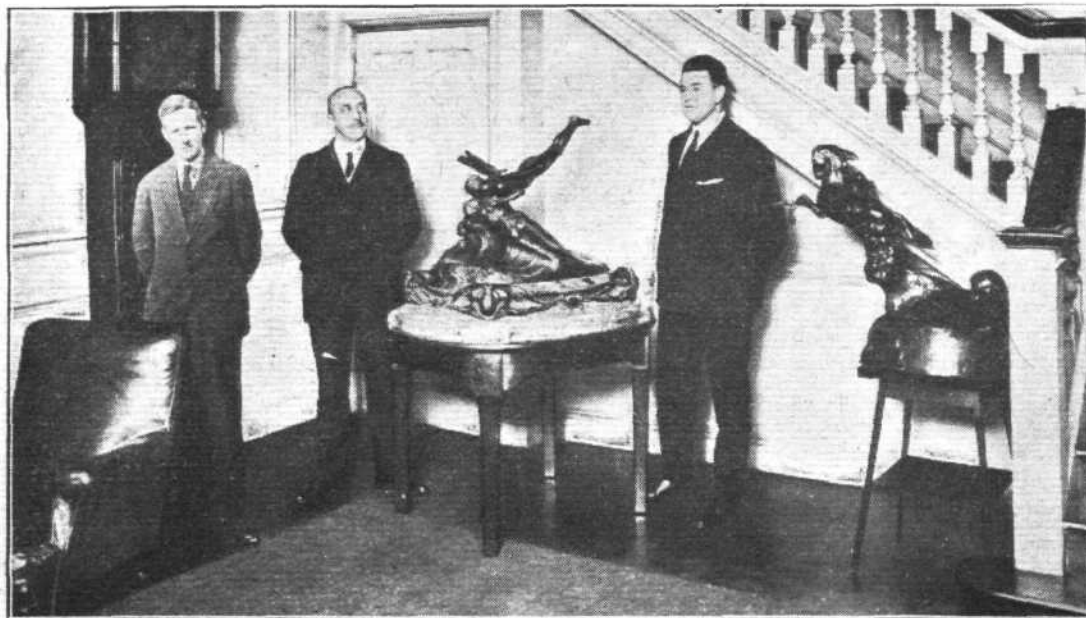
### Casale's Latest Height Record

AT Buc Aerodrome on Tuesday, the 20th inst., Jean Casale, flying a Spad Berline fitted with a 400 h.p. Gnome-Rhône-Jupiter engine, beat the height record for a machine carrying 250 kg. (550 lbs.) when he reached an altitude of 8·200 m. (26,900 ft.) This record was previously held by adjutant Le Boucher, with an altitude of 7·682 (25,200 ft.) Casale's flight was observed by a representative of the Aero Club de France, and M. Herbemont, technical director of the Spad Co. Casale intends to make an attempt in May, at the

World's height record, held by MacReady with an altitude of 10·518 m. (34,500 ft.), and will use a single seater machine, fitted with a 400 h.p. engine, for this purpose.

### Fokkers Delivered to Hungary

THE first two Fokker passenger aeroplanes, which have been built by the Fokker Co. for the Hungarian Aerial Navigation Co., have been delivered by air from Amsterdam to Budapest. They were flown by Hungarian pilots, and made the journey, *via* Berlin and Nuremberg, in fourteen hours.



The Schneider Trophy: Our photograph shows the Schneider seaplane trophy in the entrance hall of the Royal Aero Club. The three men who made it possible for it to be brought to England are seen beside the trophy. From left to right: Capt. Biard, the Supermarine pilot; Mr. H. T. Vane, C.B.E., managing director of the Napier Company, whose "Lion" engine was fitted; and Mr. Hubert Scott-Paine, managing director of the Supermarine Aviation Works, whose flying boat won the contest. The Schneider cup race is to be flown for in this country on September 28 at Cowes.



# IN PARLIAMENT

## Flying School, Netheravon

MR. HUGH MORRISON, on March 19, asked the 'Secretary of State for Air if he will cause inquiries to be made into the system of training officers and N.C.O.s as air pilots at the flying school, Netheravon; if such inquiries will state the number of times each individual student officer and non-commissioned officer of the present classes under instructions has been taken up in the Bristol fighters; whether the system in vogue enables the non-commissioned officer student to obtain the same amount of training in the air as that given to the officer; and, if not, whether steps will be taken to ensure such training for the non-commissioned officer, that there shall be no danger of failure at examination through an alleged lack of facilities?

SIR S. HOARE: I am obliged to my hon. friend for drawing my attention to this matter. It had lately appeared that the arrangements for the instruction of airmen at Netheravon were not satisfactory in respect of the amount of actual flying training which was being received. Orders were accordingly issued which will remove any deficiencies in that respect. I am to add that in the new class of officers and airman pilots which began on December 15 last, the airmen up to date have averaged 7.40 hours' flying and the officers 6.40 hours.

## Technical Staff, Farnborough

MR. ROBERT YOUNG asked the Secretary of State for Air (1) whether he has received a communication from the Association of Engineering and Shipbuilding Draughtsmen relative to the substitution of skilled draughtsmen and designers by less skilled men at the Royal Aircraft Establishment, Farnborough; whether he has refused to meet representatives of the said association on a matter of great importance to its members; and, if so, whether he will reconsider the request in order to avoid any chance of an industrial dispute arising?

(2) if he is aware that draughtsmen and designers at the Farnborough Royal Aircraft Establishment, who were debarred from joining active service units owing to the enforced protected nature of their war-time occupation, many of whom made strenuous endeavours to join up during the War, are being substituted by men of inferior technical qualifications or by men of no technical qualifications; and will he explain the reasons for the displacement which is now being carried through in this establishment and the qualifications and training of those men who are taking the place of the men being discharged?

SIR S. HOARE: Temporary non-service technical staff at Farnborough are being replaced, as far as possible, by ex-service personnel. This is in accordance with the approved policy of His Majesty's Government, based on the Reports of the Lytton Committee. It is true that many men were unable, for various reasons, to join His Majesty's forces during the late War, but this does not entitle them to be considered as ex-service, in the application of the policy just stated. I am unable to accept the suggestion of the hon. member that the ex-service men selected for appointment have inadequate technical qualifications. I have received a communication from the Association of Engineering and Shipbuilding Draughtsmen, but as the action taken is in accordance with the policy of His Majesty's Government, and was taken with full regard to all relevant considerations, no useful purpose would be served by an interview, and I regret I am unable to reconsider the decision.

## Air Ministry Staff

MR. JARRETT asked what is the total number of non-service staff, male and female, respectively, still retained in his Department; what are the reasons in each case for such retention; and whether, in view of the large number of ex-service men now unemployed and on the pool of the Joint Substitution Board, he will take steps to effect further substitution?

SIR S. HOARE: The non-service members of the temporary staff of the Air Ministry, exclusive of those under notice of discharge, are: men, 21, women 77. Except in two cases in which the qualifications are of a special nature, the Joint Substitution Board is endeavouring to find ex-service substitutes for the non-service men, while as regards the women, all but two (who are employed on draughtsmanship and will be replaced by qualified male substitutes when available) are employed upon work, chiefly typing, of a nature specially suitable for women.

## Anti-Aircraft Defence

MAJOR RUGGLES-BRICE, on March 20, asked the Under-Secretary of State for War whether, in view of the limited number of aircraft to be maintained in this country for the purpose of repelling aerial invasion, he can state what steps, if any, are being taken by means of experiment and training in the creation of a second line of defence to air attack by means of anti-aircraft guns, searchlights, or any other means?

LIEUT.-COLONEL GUINNESS: One Regular and two Territorial Air Defence brigades are in course of formation. Training and experiment are dealt with by the School of Anti-Aircraft Defence and the Searchlight Experimental Establishment, both of which are located at Biggin Hill, Kent. The question of anti-aircraft defence is under consideration by a joint War Office and Air Ministry Committee.

VISCOUNT CURZON: Does not the hon. and gallant gentleman think that the money spent on this unit would be much better put into the Air Force?

CAPTAIN WEDGWOOD-BENN: Does not the hon. gentleman think that his own Department should come under the control of the Air Ministry?

## Civil Aeroplanes

COMMANDER BELLAIRS asked the Secretary of State for Air how many civil aeroplanes have been built in Great Britain and France, respectively, since the beginning of 1919?

SIR S. HOARE: The information available relates only to machines entered in the British and French registers, the totals of which at the present date are respectively 817 and 1,030. Of the 817 British aeroplanes, 200 have been built since the beginning of 1919. I am not able at present to state the number of French machines built during the same period, but I am endeavouring to obtain this information, and will send it to my hon. and gallant friend as soon as it becomes available.

## Air Defence

COMMANDER BELLAIRS asked whether he can give an estimate as to how many service aeroplanes the existing resources of the country are capable of producing in a given time, and the most rapid period in which a percentage of these could be delivered from the date of an order?

SIR S. HOARE: I regret that I do not consider that it is in the public interest to supply this information.

## The Navy Air Arm

CAPTAIN VISCOUNT CURZON, on March 21, asked the First Lord of the Admiralty whether his attention has been called to the fact that seaplanes

of a new type have been built and commissioned by the Air Ministry for service with the Air arm of the Fleet; whether the Admiralty were consulted as to the details of the design and specification; and how many seaplanes are now serving with the Royal Navy?

MR. AMERY: The Admiralty are aware that seaplanes of a new type have been built and that trials are being carried out. These seaplanes are at present being used for experimental purposes, and they are not, therefore, allocated for service with the Air arm of the Fleet. The Admiralty is consulted in regard to development, but not in regard to details of design and specification, which are laid down by the Air Ministry. The seaplanes now supplied for operation with the Navy consist of 12 float-planes and 10 flying boats.

VISCOUNT CURZON: Is it the practice of the Air Ministry to consult with the Admiralty in regard to the design of seaplanes?

MR. AMERY: No, Sir. They consult with the Admiralty as regards general development, and work out the details themselves.

VISCOUNT CURZON asked how many 'planes of the following types are allocated to the branch of the Royal Air Force operating with the Navy: fighters, bombers, reconnaissance, and torpedo planes?

MR. AMERY: The numbers of aircraft allocated for operations with the Navy are:

Fighters—Six. Bombers—Nil. Reconnaissance—Eighteen (including six float-planes). Spotting planes—Eighteen (including six float-planes). Torpedo planes—Twelve.

I understand from the Air Ministry that there are also in the first line reserve which is kept at the unit's base, machines to the number of 50 per cent. of the unit's strength in the case of units in Home waters, and 100 per cent. in the case of units abroad.

The above figures do not include flying boats or experimental craft, and do not take into account increases provided for in the Estimates for 1923-24.

VISCOUNT CURZON: Does the right hon. gentleman think the Navy is up to a one-power standard when it has only six fighters and no bombers whatever?

MR. AMERY: That is being fully considered by a Committee.

CAPTAIN BRASS: May I ask who pays for these machines? Do they appear in the Estimates for the Air Force or for the Navy?

MR. AMERY: They come on the Air Force Estimates.

## Royal Air Force

COMMANDER BELLAIRS asked the Secretary of State for Air whether he will give the explanation of the disparity between the official figure of 371 aeroplanes possessed by Great Britain and the existence of 34 squadrons of 12 aeroplanes each; and, if the explanation is that some of the squadrons are below their proper strength, whether those squadrons are home squadrons?

SIR S. HOARE: The 371 aeroplanes to which I referred in my speech on March 14 are first line machines of formed squadrons, and did not include the aeroplanes of the two squadrons which are being formed as part of the new expansion scheme, and which my hon. and gallant friend will see from my statement were included in the total of 34 squadrons. It must be further remembered that a few squadrons have an establishment of 10 or 11 instead of 12 aeroplanes. The apparent discrepancy is explainable upon these grounds, and not upon that of any squadrons being below strength.

## Swedish Aero Exhibition

REAR-ADMIRAL SUETER, on March 22, asked the Secretary of State for Air whether the Air Ministry have considered the advisability of supporting the British air industry in showing exhibits at the Gothenberg Air Exhibition, Sweden; and whether he has any information as to what France is doing to support this air exhibition?

LIEUT.-COLONEL SIR S. HOARE: The answer to the first part of the question is in the affirmative, and I may say that I am anxious that British air interests may be properly represented at the Exhibition. An official committee, under the chairmanship of the Director of Civil Aviation, and including representatives of the Air Ministry, Department of Overseas Trade, the Society of British Aircraft Constructors, Limited, and the British Advisory Committee of the Exhibition, has been formed to advise me in this matter, and to co-ordinate the efforts of the British air industry in showing exhibits at the Exhibition. As regards the second part of the question, I understand that France is proposing to support the Exhibition, and is sending an exhibit on a scale fully representative of her air industry.

## Croydon Aerodrome Housing

MR. EDE asked if, in connection with the proposed developments to the Croydon aerodrome, he contemplates providing housing for the persons who will be employed there when the developed aerodrome is at work; whether he is aware that the housing shortage is particularly acute in the neighbourhood of the aerodrome; and, if he does not propose to build houses as part of the necessary development of the aerodrome, how it is proposed to house the staff without causing further overcrowding in the existing houses in the neighbourhood?

SIR S. HOARE: I am aware that there is a considerable shortage of the cheaper houses in the district in question, and that some of the mechanics and traffic hands have to come long distances to their work. I do not think, however, that the present difficulties will be made greater by the proposed development of the aerodrome, which is not likely to cause an appreciable increase in the permanent Government establishment of personnel at Croydon, nor do I think that the Air Ministry could undertake to remedy the shortage by building houses. An improvement is only to be looked for in increased local building activities.

## Helicopters

LIEUT.-COMMANDER KENWORTHY asked what progress has been made with the helicopter system of flying?

SIR S. HOARE: Satisfactory progress is being made with the experiments which are being conducted by the Air Ministry, and to which I assume that the hon. and gallant Member refers, and I hope that a trial will take place shortly.

LIEUT.-COMMANDER KENWORTHY: Is the reward still available for any private inventor?

SIR S. HOARE: Yes, Sir. I am offering a reward, and I think it is included in this year's Estimate.

CAPTAIN VISCOUNT CURZON: Is every encouragement being given to private inventors as well as to the Royal Aircraft Factory to produce the best machines?

SIR S. HOARE: Yes, the inventor now actually engaged in this work is a private mechanic.

## The Gordon-Bennett Balloon Race

THE list of entries for this year's Gordon-Bennett Balloon Race, which has just been closed, discloses a representative number of competitors, there being a total of 21 altogether,

representing eight countries. These include the following: Three entries each from America, Belgium, France, Italy, Spain and Switzerland; two from England, and one from Poland. The race starts from Brussels on September 23.



# THE ROYAL AIR FORCE

London Gazette, March 16, 1923

## Reserve of Air Force Officers.

Class A.—The follg. are granted commns. in the General Duties Branch as Flying Offrs. on probation (March 10):—E. B. Wilson, J. Edelsten.

Class C.—Flying Offr. E. Marsden is transfd. from Class A to Class C; March 8.

London Gazette, March 20, 1923

## General Duties Branch.

Cadet C. F. Sealy is granted permanent commn. as Pilot Officer, having successfully passed through the R.A.F. (Cadet) College; Jan. 20. Flying Officer J. S. Chick, M.C., is granted permanent commn. in rank stated; Oct. 24, 1919. (Gazette, Oct. 24, 1919, appointing him to short service commn.

is cancelled). F. W. van Blommestein is granted short service commn. as Flying Officer, with effect from, and with seny. of; March 9.

The follg. Lieuts., R.F.A., are granted temp. commn. as Flying Officers on seconding for four years' duty with the R.A.F.; March 14. I. O.B. MacGregor, W. F. A. Preston.

Flying Officer W. B. J. Humphrey relinquishes his short service commn. on account of ill-health; March 21. Flying Officer A. Deakin is placed on the retired list; March 18.

## Stores Branch.

Flying Officer C. Littlejohn, M.M., is confirmed in rank; Feb. 23.

## Medical Branch.

E. Bennett is granted a permanent commn. as a Quartermaster and Flight Lieut.; Jan. 17.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the R.A.F. are notified:—  
Group Captain: E. R. C. Nanson, D.S.C., A.F.C., from R.A.F. Depot (Inland Area) to Inspector of Recruiting (Coastal Area) (Supernumerary). For duty as Inspector of Recruiting. 15.3.23.

**Wing Commanders:** O. T. Boyd, O.B.E., M.C., A.F.C., from No. 24 Squadron (Inland Area) to command School of Army Co-operation (Inland Area) 26.2.23. H. R. Busteed, O.B.E., A.F.C., from R.A.F. Base, Gosport (Coastal Area) to No. 1 Group Headquarters (Inland Area). 16.4.23. R. J. Bone, C.B.E., D.S.O., from Inspector of Recruiting (Coastal Area) to command R.A.F. Base, Calshot (Coastal Area) (Supernumerary). 6.4.23. J. E. A. Baldwin, D.S.O., O.B.E. from R.A.F. Staff College (Inland Area) to R.A.F. Depot (Inland Area) (Supernumerary). 4.4.23. R. E. C. Peirse, D.S.O., A.F.C., from R.A.F. Staff College (Inland Area) to command R.A.F. Base, Gosport (Coastal Area) (Supernumerary). 4.4.23.

**Squadron Leaders:** V. Gaskell-Blackburn, D.S.C., A.F.C., from R.A.F. Trans-Jordanian Headquarters (Palestine Command) to Aircraft Depot (Middle East). 20.2.23. F. J. Rutland, D.S.C., A.M., from Headquarters, Coastal Area, to Half-pay List. 3.3.23. H. A. Hewat, M.B., D.T.M., from Central Medical Board (Coastal Area) to Headquarters, Iraq Command (Supernumerary). 23.2.23. B. E. Smythies, D.F.C., from R.A.F. Staff College (Inland Area) to No. 41 Squadron (Inland Area) to command on completion of Staff course. 4.4.23. W. A. McClaughry, D.S.O., M.C., D.F.C., from R.A.F. Staff College (Inland Area) to No. 5 Wing Headquarters (Inland Area). 4.4.23. K. R. Park, M.C., D.F.C., from R.A.F. Staff College

(Inland Area) to R.A.F. Depot (Inland Area) (Supernumerary). 4.4.23. H. S. Powell, M.C., from R.A.F. Staff College (Inland Area) to No. 24 Squadron (Inland Area) (Supernumerary). 4.4.23. E. B. Beauman, from R.A.F. Staff College (Inland Area) to R.A.F. Base, Leuchars (Coastal Area). For command of Reconnaissance Flights. 4.4.23.

**Flight Lieutenants:** W. S. Magrath, from No. 14 Squadron (Palestine Command) to R.A.F. Trans-Jordanian Headquarters (Palestine Command). 1.3.23. D. McLaren, M.B., from R.A.F. Hospital, Cranwell to Headquarters, Iraq Command. 23.2.23. T. McClurkin, M.B., D.P.H., from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to Baghdad Combined Hospital (Iraq Command). 23.2.23. C. H. Hayward, from R.A.F. Staff College (Inland Area) to No. 24 Squadron (Inland Area). 4.4.23. J. B. Cole-Hamilton, from R.A.F. Staff College (Inland Area) to No. 1 Flying Training School (Inland Area). 4.4.23. H. S. Kerby, D.S.C., A.F.C., from R.A.F. Staff College (Inland Area) to No. 3 Group Headquarters (Inland Area). 4.4.23. N. W. Wadham, from R.A.F. Staff College (Inland Area) to No. 3 Group Headquarters (Inland Area). 4.4.23. W. R. D. Acland, D.F.C., A.F.C., from R.A.F. Staff College (Inland Area) to Headquarters, Coastal Area. 4.4.23. W. B. Farrington, D.S.O., from R.A.F. Staff College (Inland Area) to No. 2 Flying Training School (Inland Area). 4.4.23. E. B. C. Betts, D.S.C., D.F.C., from R.A.F. Staff College (Inland Area) to No. 1 Flying Training School (Inland Area). 4.4.23. G. M. Lawson, M.C., from R.A.F. Staff College (Inland Area) to No. 3 Group Headquarters (Inland Area). 4.4.23.

## R.A.F. War Memorial

H.R.H. THE PRINCE OF WALES has kindly consented on Monday, July 16, to unveil the War Memorial, erected upon Westminster Embankment by the Royal Air Force Memorial

Fund to the memory of the Officers and Airmen of the Royal Air Forces of the Empire who fell in the Great War. H.R.H. the Duke of York, President of the Royal Air Force Memorial Fund, has signified his intention of being present on this occasion.



**R.A.F. FOOTBALL IN EGYPT:** Our photograph shows the football team of the Engine Repair Depot, R.A.F., Abbassia, Egypt. From left to right: in top row, A. C/2 Gavin, A. C/1 Guest, L.A.C. Collett, A. C/2 Sambrooke, A. C/2 Milligan, Cpl. Steadman, A. C/1 Taylor, A. C/2 Crabtree, and A. C/2 Cowley. Seated: A. C/2 Green, A. C/1 Hare, Sq. Ldr. A. Corbett-Wilson, Fl. Offr. W. E. Townsend, A. C/2 Underhill, A. C/2 Mathers. The team is winner of the following events: Premier Football Cup of Egypt (Robert S. Hughes Charity Cup), and R.A.F. League (Cairo District). Runners up R.A.F. Cup, Egypt, present runners up Military League (Cairo District). It might also be mentioned that eight of the E.R.D. team represented the R.A.F. against the Army in Egypt. This was down for decision on February 16, 1923, and after one of the finest games seen in Egypt resulted in a draw (R.A.F. 1, Army 1 (penalty)).



## THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

(London Aero Models Association)

THE lecture given by Mr. A. F. Houlberg on "Power Plants for Model Aeroplanes" was enthusiastically received by the members. The discussion on same will be continued on Friday evening, April 6, at 7.30 p.m.

There will be no meeting at Headquarters on the 30th inst.

March 31, at 3.30 p.m., Wimbledon Common.—A competition for the "D. H. Pilcher" Challenge Cup.

April 14.—Attempts at the General Records will be made at Wimbledon Common, at 2.30 p.m.

A. E. JONES, Hon. Sec.

## PADDINGTON DISTRICT AERO CLUB

(Affiliated to the S.M.A.E.)

At a General Meeting of the above Club, held on March 20, it was resolved to continue affiliation with the Society of Model Aeronautical Engineers. The pre-War subscription of 1s. per month will be resumed as from April 1.

Mr. W. E. Evans reluctantly resigned the offices of secretary and treasurer. Mr. M. Levy was unanimously elected to carry on those offices for the ensuing year.

The Club's programme for the coming season was entrusted to a sub-committee, Messrs. Evans, Levy and Woolley.

Mr. F. de P. Green was elected a member.

It is the Club's intention to work in harmonious co-operation with the S.M.A.E.

W. E. EVANS, late Hon. Sec.

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## SIDE-WINDS

An important announcement comes from Titanine, Ltd., of 175, Piccadilly, W. 1. This is to the effect that they have recently purchased and taken over the good-will, stocks, patents trade marks, etc., of the British Emaillite Co., Ltd. (in liquidation), in so far as appertains to the aircraft trade. While they will continue to supply "Emaillite" products when specified, this will in no way interfere with their main activity—the sale of the well-known "Titanine" products. Perhaps we shall see a new dope on the market called "Tite Ema" or "Emanine"?

OWING to the large increase in demand, not only for "Cellon" dope, but particularly for "Cerric" materials, Cellon (Richmond), Ltd., find a call for much closer co-operation between certain office departments and the Works. Therefore they have decided to move the following departments from the head office (22, Cork Street, W. 1) to the Works, as from March 26: Sales Department, Buying Department, and Accountants Department. All correspondence after the above date should, therefore, be addressed: Cellon Works, Petersham Road, Richmond, Surrey. (Telephone, Richmond 2213; telegrams, A.J.W.A.B., Richmond, Surrey.)

MR. T. STANDARD JONES, B.Sc., A.I.C., late of the Air Ministry Inspection Laboratories, has taken up a position in the Research Department of Titanine, Ltd., of 175, Piccadilly and Hendon.

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## Mercantile Aircraft Carriers

AMONG the interesting papers submitted for discussion at the first annual meeting of the Institution of Naval Architects on March 21 was one by Sir Eustace d'Eyncourt and Mr. John H. Narbeth, entitled "A Proposed Aircraft-carrying Mail Steamer." The paper pointed out that experience gained with naval aircraft carriers had proved that flying on to and off from ships at sea was now becoming thoroughly practicable, and outline drawings were given of an ocean-going mail steamer which was also an aircraft carrier. The authors pointed out that it might well be that we had now got to a point where the aircraft carrier would become relatively as important to the mercantile marine as to the Navy. The paper called attention to the similarity in the problems of the mercantile marine and the mercantile air service. The question that arose, the paper stated, was: "Could any practical proposals be made which would place British commercial air services on a more commercial basis?" The authors suggested that one way might be to make use of the British steamship companies, and regarding the air service as the handmaid of the steamer services. They suggested that a considerable amount of time could be saved if the large trans-oceanic vessels had accommodation for aircraft on board and were fitted with flush decks from which aircraft could start and on which they could alight. Before a vessel bound from London to New York reached the coast aircraft could be sent away with urgent mail, and would reach its destination long before the steamer. Another machine could,

for instance, be dispatched to Montreal, which would be reached by the aircraft before the steamer arrived in New York. The possibilities are immense, and it is extremely gratifying to find men like Sir Eustace d'Eyncourt so thoroughly alive to them that they put forward such very practical suggestions as those contained in this paper. A good deal still remains to be discovered regarding the best type of aircraft to use—land machine or seaplane, flying boat or float seaplane, single-purpose machine or amphibian—but the very fact that the problem is now being discussed at the Institution of Naval Architects is in itself extremely promising, and tends to show that aircraft, so far from being a competitor to steamships, should rather be regarded as a very valuable complementary service.

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## PUBLICATIONS RECEIVED.

*Mūsų Žinytas*. No. 10, 1923. "Mūsų Žinytas," Karo Mokslo Skyrius, Laisves Aleja No. 12, Kaunas.

*Department of Overseas Trade. Report on the Economic and Financial Conditions in Belgium, December, 1922.* By J. Picton Bagge. London: H.M. Stationery Office, Kingsway, W.C. Price 2s. 6d. net. By post 2s. 8d.

*The Professional Photographer.* March, 1923. Kodak Ltd., Kingsway, W.C. 2.

*Atti dell' Associazione Italiana di Aerotecnica. Associazione Italiana di Aerotecnica, Lungitovere Michelangelo, 10, Rome.* Price, Lire 15.

*Technical Note:*

No. 123. An Optical Altitude Indicator for Night Landing. By J. A. C. Warner. January, 1923.

Catalogue.

*Brittain's Electric Motors.* Brittain's Electric Motor Co., 110, Cannon Street, London, E.C. 4.

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## AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1921

Published March 29, 1923

22,819. INTERNATIONAL ALL-STEEL AIRCRAFT SYND., LTD., H. BOLAS and G. G. PARNALL. Aircraft. (193,880.)

31,812. PAXTON GYROSCOPE CORPORATION. Gyroscope compasses. (172,029.)

33,299. R. HARRIS. Engine starter. (194,011.)

APPLIED FOR IN 1922

Published March 29, 1923

4,445. D. J. MOONEY and D. H. EMBY. Metal spars. (194,114.)

18,083. A. RATEAU. Means for increasing feed pressure in I.C. engines. (182,786.)

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